

SPECIES OF ELEPHANTORRHIZA IN THE SOUTH AFRICAN HERBARIA.

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The genus *Elephantorrhiza* is a small genus belonging to the *Leguminosae*, and was founded by Bentham in 1842 on the common Transvaal plant, *E. Burchellii*. Four years later he described another species also from the Transvaal, *E. Burkei*. Since then Schinz and Harms each described a species found in South Africa, and two years ago Mr. Burtt-Davy described a species from the Transvaal. An examination of the material in the South African Herbaria has brought to light two additional species which hitherto have been confused with *E. Burchellii*.

Two of the seven species found in South Africa have an acaulescent habit, viz., *E. Burchellii* and *E. obliqua*.

The shape and venation of the pinnules differ in all the species, and afford a good character whereby the species may be distinguished. The reader is referred to the accompanying plate illustrating the pinnules of the seven species described.

Elephantorrhiza Burchellii, commonly known as "Eland's Boontjes," is an extremely common plant on the high veld in spring, and in many parts of the Transvaal is the dominant species on veld which has been burnt. It is an acaulescent plant with enormous roots, which extend to a considerable depth into the ground. Young plants have been excavated by the writer with roots which penetrate to a depth of over 6 feet. The roots of this species have been used for tanning, but other plants have now superseded it. Mr. C. Howlett, of the Division of Botany, carried out a series of dyeing experiments with a 30 per cent. solution of the roots. Wool was treated with a 1 per cent. of the following mordants, and gave the following results (the colours mentioned are those of Ridgway's Colour Standards and Nomenclature):—

1. Ammonium molybdate.....Orange rufous. (Plate II.)
2. Ammonium vanadate.....Plumbeous black. (Plate LII.)
3. Chromium chloride.....Naphthalene yellow. (Plate XVI.)
4. Ferrous sulphate.....Quaker drab. (Plate LI.)
5. Nickel sulphate.....Salmon colour. (Plate XIV.)
6. Stannous chloride.....Empire yellow. (Plate IV.)
7. Sodium tungstate.....Salmon colour. (Plate XLV.)
8. Uranium nitrate.....Rufous. (Plate XIV.)
9. Zinc sulphate.....Salmon colour. (Plate XIV.)
10. Cobalt acetate.....Bittersweet pink. (Plate II.)

The above colours are, however, not permanent, and since these experiments were conducted some three years ago some of the colours in the samples of wool have changed.

The seeds of this species show an interesting and uncommon type of germination, which has been described by Miss J. Hofmeyr in the "South African Journal of Natural History," Vol. III, No. 1.

The writer is indebted to the Curators of the various Herbaria for lending him the material in their respective collections, and to Mr. J. Hutchinson, F.L.S., of the Kew Herbarium, for comparing some of the specimens with material in the Kew and British Museum Herbaria.



Del. Stella Gower.

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| Fig. 1.— <i>E. obliqua</i> , Benth., Favy, var. <i>Glabra</i> , Pnill. | Fig. 3.— <i>E. pubescens</i> , Phill. |
| Fig. 2.— <i>E. Burchellii</i> , Benth. | Fig. 5.— <i>E. rangeri</i> Phill. |
| Fig. 4.— <i>E. Burkei</i> , Benth. | Fig. 7.— <i>E. suffruticosa</i> , Schinz. |
| Fig. 6.— <i>E. Woodii</i> , Phill. | |

KEY TO SPECIES.

- Acaulescent plants with leaves and inflorescence arising from large and thickened root-stocks.
- Pinnules ovate, prominently oblique at the base..... 1. *obliqua*.
Pinnules linear, not or scarcely oblique at the base..... 2. *Burchellii*.
- Shrubs or small trees with a distinct aerial stem.
- Branches pubescent.
- Inflorescence about 1 cm. in diameter; calyx lobes acute, as long as the tube; pinnules glabrous..... *Woodii* var. *pubescens*
Inflorescence about 7 mm. in diameter; calyx lobes obtuse, half as long as the tube; pinnules pubescent..... 3. *pubescens*.
- Branches glabrous.
- Midrib more or less in the middle of the pinnule; pinnules equal at the base..... 4. *Burkei*.
Midrib approaching one margin of the pinnule; pinnules oblique or manifestly unequal at the base.
- Pinnules with a distinct lateral vein from the base and parallel with the margin..... 5. *Ranggeri*.
Pinnules with a midrib only.
- Leaves 5-10-jugate; branches fluted..... 6. *Woodii*.
Leaves about 20-jugate; branches not fluted..... 7. *suffruticosa*.

1. *E. obliqua*, Burt-Davy, in "Kew Bulletin" (1920).

An acaulescent plant. *Stem* pubescent. *Leaves* bipinnate, 9-20 cm. long, 4-6 jugate; petiole and rachis pubescent; pinnae 3-8 cm. long; pinnules 0.6-1.5 cm. long, 2-6 mm. broad, ovate, very distinctly mucronate at the apex, very unequal at the base, glabrous, with the midrib prominent beneath, approaching one margin of the pinnule and excurrent into the mucro; lateral veins faint. *Inflorescence* axillary, 4-6 mm. long, cylindrical. *Flowers* pedicelled. *Pedicels* about 1 mm. long, glabrous, articulated at the middle. *Calyx-tube* 0.75-1.5 mm. long, campanulate, glabrous; lobes 0.5 mm. long or less, ovate, obtuse, or subacute (sometimes one lobe minutely apiculate). *Petals* sometimes slightly connate at the base, 3.5-4 mm. long, 1 mm. broad, oblong-linear, cucullate, and with an inflexed mucro at the apex, glabrous. *Filaments* connate at the base, 6 mm. long, linear, glabrous; anthers 1 mm. long, elliptic, with a caducous stalked gland at the apex. *Ovary* sessile, 5 mm. long, linear in outline, glabrous; style 7 mm. long, cylindrical; stigma simple, opening by an apical pore. *Fruit* not seen.

TRANSVAAL.—Wakkerstroom District: Volksrust, *Jenkins in Herb. Transvaal Mus.* 9296.

Var. *glabra*, Phillips (Pl. V, fig. 1; Pl. VI).

Differs from the type in being perfectly glabrous and in the veining of the pinnules being very distinct.

TRANSVAAL.—Middelburg District: Middelburg, *Jenkins in Herb. Transvaal Mus.* 9128; Botsabelo, *Eiselen in National Herb.* 1229.

2. *E. Burchellii*, Bth., in Hook. "Journ. Bot.," IV (1842) 344 (Pl. V, fig. 2; Pl. VI).

An acaulescent plant. *Stem* glabrous. *Leaves* bipinnate, 5.5-22 cm. long, 5-13-jugate; petiole and rachis glabrous; pinnae 2.5-11 cm. long; pinnules 0.3-1.4 cm. long, 0.25-2 mm. broad, subulate, linear to linear-oblong, acute, slightly narrowed and equal at the base, glabrous, with the midrib distinct and approaching one margin of the leaf. *Inflorescence* arising from the woody portion of stem, also axillary, 4-11 mm. long, cylindrical. *Flowers* pedicelled. *Pedicels* 0.5-1.5 mm. long, usually articulated at the base, sometimes at the middle. *Calyx-tube* 0.75-1.25 mm. long, campanulate, glabrous; lobes 0.5-1 mm. long, ovate, acute or obtuse. *Petals* free or slightly connate at the base, 3-4 mm. long, 1 mm. broad, oblong or oblong-lanceolate, acute or subacute, sometimes cucullate at the apex, glabrous. *Filaments* connate at the base, 5.5-6.5 mm. long, linear, glabrous; anthers 0.75-1 mm. long, suborbicular or elliptic, with a caducous stalked gland at the apex. *Ovary* sessile, 3 mm. long, linear in outline, glabrous; style 4-5 mm. long, cylindrical; stigma simple, opening by a terminal pore. *Fruit* 8-20.5 cm. long, 2.6-3.8 cm. broad; valves flat or convex.—*Harr. in "Fl. Cap.," II, 277.*

SOUTH AFRICA.—Without precise locality, *Mrs. Barber* 55; *Zeyher* 127.

CAPE PROVINCE.—Queenstown District: Zwatkei, December, *E. & Z.* 1693; near Mission Station at Shiloh, 2000 ft., December, *Baur* 379, and in *Herb. Norm. Austro-Afric.* 964; plains round Queenstown, 3600 ft., October, *Galpin* 1917. Kimberley District: Kimberley, *Marloth* 852.

BASUTOLAND.—Leribe District: Near Mission Station at Leribe, *Mrs. Dieterlen* 46, and in *Herb. Musei Austro-Afric.* 7256.

ORANGE FREE STATE.—Ladybrand District: Ladybrand, November, *Rogers in Herb. Transvaal Mus.* 5057; between Senekal and Bethlehem, c. 5000 ft., December, *Flanagan* 1903. Harrismith District: Bester's Vlei, near Harrismith, 5500 ft., December, *Bolus* 8157. Bethlehem District: Bethlehem, *Phillips* 3186. Bloemfontein District: P.O. De Burg, Bloemfontein, February, *Cyrus in Gort. Herb.* 8794. Thabanchu District: Caledon and Vaal Rivers, December, *Zeyher*; Pniel, Vaal River, 4000–5000 ft., November, *Bolus* 2075.

TRANSVAAL.—Potchefstroom District: Potchefstroom, May, *Burt-Dary in Gort. Herb.* 52. Heidelberg District: Vereeniging, September, *Leslie in Herb. Transvaal Mus.* 5673; Heidelberg, November, *Miss Leendertz in Herb. Transvaal Mus.* 8094. Bloemhof District: "Kaffraria," Christiana, March, *Native Aaron in Gort. Herb.* 14432. Marico District: Zeerust, January, *Miss Leendertz in Herb. Transvaal Mus.* 11433. Witwatersrand District: Jeppetown Ridge, Johannesburg, c. 6000 ft., October, *Gilfillan* 44A, and in *Herb. Galpin* 6006; Florida, near Johannesburg, December, *Mrs. Hutton* 621. Pretoria District: Groenkloof, near Pretoria, *Phillips* 3051; Pretoria Kopjes, October, *Miss Leendertz* 341, and in *Herb. Transvaal Mus.* 8428, and in *Herb. Austro-Afric.* 1077, October, *Burt-Dary* 2294; Gezina, near Pretoria, November, *Miss Leendertz* 434, and in *Herb. Transvaal Mus.* 8429. Rustenburg District: Rustenburg, 4500 ft., *Miss Nation* 225; Beestkraal, December, *Jenkins in Herb. Transvaal Mus.* 6963. Waterberg District: Near Nylstroom, November, *Burt-Dary* 2017; Springbok Flats, 3000 ft., October, *Burt-Dary in Gort. Herb.* 7066; Pietpotgietersrust, October, *Miss Leendertz in Herb. Transvaal Mus.* 7383; Moorddrift, October, *Miss Leendertz in Herb. Transvaal Mus.* 7364. Wakkerstroom District: Mooifontein, 5500 ft., October, *Schlechter* 3567, and in *Herb. Transvaal Mus.* 5399. Barberton District: Hillsides at Barberton, 2300–2800 ft., September–October, *Galpin* 562; Barberton, November, *Miss Williams in Herb. Transvaal Mus.* 7637, 3000 ft., December, *Thorncroft*, 666, and in *Natal Herb.* 15089.

SWAZILAND.—Without precise locality, *Miss Stewart in Herb. Transvaal Mus.* 8857. Batlapin County: Without precise locality, *Nelson in Herb. Transvaal Mus.* 11740.

KALAHARI.—Without precise locality, *Schinz.* 276. Vryburg District: Armoed's Vlakte, November, *Burt-Dary in Gort. Herb.* 10963.

NATAL.—Mount Moreland, 500 ft., May, *Wood* 2607; Nonoti, 100–200 ft., October, *Natal Herb.* 14202.

3. *E. pubescens*, Phillips, sp. nov. (Pl. V, fig. 3).

Rami pubescentes. *Folia* 2–10-jugate; foliola 5–8·5 mm. longa, 1 mm. lata, oblongo-linearia, apice mucronata, basi obliqua, pubescentia. *Inflorescentia* 7 cm. longa, 7 mm. lata, cylindrica. *Pedicellus* 0·5 mm. longus, glaber. *Tubus calyci* 0·5 mm. longus, campanulatus; lobi 0·25 mm. longi, ovati, apice obtusi.

RHODESIA.—Six miles below Kafue Bridge, *Rogers* 8659.

Branches striate, pubescent. *Leaves* bipinnate, 4–17 cm. long, 2–10-jugate; petiole and rachis pubescent; pinnae 5–7 cm. long; pinnules 5–8·5 mm. long, 1 mm. broad, oblong-linear, shortly mucronate, unequal at the base, pubescent more especially on the under surface, with the midrib distinct and approaching one margin of the pinnule. *Inflorescence* axillary, 7 cm. long, about 7 mm. in diameter, narrowly cylindric. *Flowers*



Elephantorrhiza Burchellii, Benth.

Elephantorrhiza obliqua, Burt-Davy,
var. *glabra*, Phillips.



[Photo]

Field of *Elephantorrhiza Burchellii*, Benth., at
Groenkloof, near Pretoria. [E. P. Phillips.]

pedicelled. *Pedicels* 0.5 mm. long, glabrous. *Calyx-tube* 0.5 mm. long, campanulate, glabrous; lobes 0.25 mm. long, ovate, obtuse, not ribbed. *Corolla*, with a tube, 0.5 mm. long; lobes 2 mm. long, 0.75 mm. broad, oblong, obtuse, slightly inflexed at the apex. *Filaments* connate at the base, 3.5 mm. long, linear, acute at the apex, glabrous; anthers scarcely 0.5 mm. long, subglobose, with a minute caducous gland at the apex. *Ovary* shortly stalked, 1.5 mm. long, linear in outline, glabrous; style 2 mm. long, cylindrical; stigma simple.

This species is readily distinguished from the former by the pubescent pinnules and the short, rounded calyx lobes, which are only half as long as the calyx-tube.

4. **E. Burkei**, Benth., in Hook., "Journ. Bot.," V (1846) 81 (Pl. V, fig. 4).

A branched shrub 3-5 ft. high, or small tree 8-10 ft. high. *Stem* and branches glabrous. *Leaves* bipinnate, 7-23 cm. long, 4-6-jugate; petiole and rachis glabrous; pinnæ 3-10 cm. long; pinnules 0.7-1.6 cm. long, 1-3 mm. broad, oblong or linear-oblong, obtuse, or shortly and bluntly mucronate at the apex, sometimes emarginate, slightly narrowed and equal at the base, with the midrib distinct beneath and situated in the middle of the pinnule. *Inflorescence* axillary, 5-10 cm. long, cylindrical. *Flowers* pedicelled; pedicels 0.75-2 mm. long, articulated at the middle, more rarely at the base. *Calyx-tube* 1-1.5 mm. long, campanulate, glabrous; lobes 0.5-1 mm. long, ovate, subacute or obtuse, usually (rarely without) with very minute but distinct projections in the sinuses or on the margins of the lobes. *Petals* 2.5-4 mm. long, 1.25-1.5 mm. broad, lanceolate, elliptic-lanceolate or elliptic, cucullate and inflexed at the apex, glabrous. *Filaments* connate at the base, 4-6.5 mm. long, linear, glabrous; anthers 0.75-1 mm. long, elliptic or almost quadrate in outline, with a stalked caducous gland at the apex. *Ovary* sessile, 2-3 mm. long, linear in outline, glabrous; style 2.5-4 mm. long, cylindrical; stigma simple, opening by a terminal pore. *Fruit* 7-21 cm. long, 2.8-3.5 cm. broad; valves flat.—*Harc.* in "Fl. Cap.," II, 279; *E. rubescens*, Gibbs in "Journ. Linn. Soc. Bot., XXXVI, 441 (1906).

SOUTH AFRICA. Without locality (probably Portuguese East Africa), *Junod* 435. Transvaal. Pretoria District: Kopjes about six miles east of Pretoria, *Phillips* 3040; Wonderboom Poort, near Pretoria, October, *Miss Leendertz* 314, and in *Herb. Transvaal Mus.* 8430; near the "Wonderboom," December, *Burt-Davy* 2663, *Miss Leendertz* 433, and in *Herb. Transvaal Mus.* 8431; Magaliesburg, October, *Zeyher* 560, 321. Waterberg District: Warmbaths, January, *Bolus* 11862; Pietpotgietersrust, September-January, *Miss Leendertz* in *Herb. Transvaal Mus.* 4757, 5581. Bechuanaland.—Mafeking, *Appleyard*.

RHODESIA. South Rhodesia: Matlopo Hills, 4500 ft., September, *Rogers* 5335, *Galpin* 7081; Zambesi Gorge, 2900 ft., September, *Galpin* 7062.

5. **E. Rangeri**, Harms. in Engl., "Bot. Jahrb.," XLIX, 420 (1913) (Pl. V, fig. 5).

A shrub 4 m. (?) high. *Branches* glabrous. *Leaves* bipinnate, 10-19 cm. long, 5-7-jugate; petiole and rachis glabrous; pinnæ 3-6.5 cm. long; pinnules 4-9 mm. long, 0.5-1.75 cm. broad, linear-oblong, shortly and bluntly mucronate, somewhat narrowed at the base and hardly unequal, with the midrib distinct approaching one margin, and a lateral vein arising from the base and approaching the opposite margin, glabrous. *Inflorescence* axillary, 5.5-6.5 cm. long, cylindrical. *Flowers* pedicelled. *Pedicels* 0.75 mm. long, articulated at the base. *Calyx-tube* 1 mm. long, campanulate, glabrous; lobes 0.5 mm. long, broad, oblong-lanceolate, obtuse or subacute, glabrous. *Filaments* connate at the base, 5 mm. long, linear, glabrous; anthers 0.75 mm. long, almost quadrate in outline, with a caducous stalked gland at the apex. *Ovary* sessile, 2 mm. long, linear in outline, glabrous; style 2.5 mm. long, cylindrical; stigma simple, opening by a terminal pore. *Fruit* not seen.

SOUTH-WEST AFRICA.—Hohearte (?), December, *Dinter* 2264, and in *Herb. Muses. Austro-Afric.* 4485.

6. **E. Woodii**, Phillips, sp. nov. (Pl. V, fig. 6.)

Rami glabri, striati. *Folia* 5–10-jugata; foliola 2.5–4 mm. longa, 1 mm. lata, oblongo-lineararia, apice acuta, mucronata, base obliqua, glabra. *Inflorescentia* 8.5–11 cm. longa, cylindrica. *Tubus calyci* 0.75–1.25 mm. longus, campanulatus, glaber; lobi 0.25–5 mm. longi, ovati, apice acuti.

NATAL.—Weenen County: Pieters, near Colenso, 3000–4000 ft., *Wood* 7958, and in *Natal-Govt. Herb.* 8768.

Branches glabrous, fluted. *Leaves* bipinnate, 6–15 cm. long, 5–10-jugate; petiole and rachis glabrous; pinnae 1.8–6 cm. long; pinnules 2.5–4 mm. long, 1 mm. broad, oblong-linear, acute, mucronate, very unequal-sided at the base, with the midrib indistinct or evident and then approaching one margin of the leaf, glabrous. *Inflorescence* axillary, 8.5–11 cm. long, cylindric. *Flowers* pedicelled. *Pedicels* 1.25–1.5 mm. long, articulated at the base. *Calyx-tube* 0.75–1.25 mm. long, campanulate, glabrous; lobes 0.25–5 mm. long, ovate, acute. *Petals* slightly connate at the base, 3.5–4.5 mm. long, 1.25 mm. broad, lanceolate, acute. *Filaments* connate at the base, 3.5–5 mm. long, cylindric, glabrous; anthers 1 mm. long, elliptic, with a caducous stalked gland at the apex. *Ovary* sessile, 2.5 mm. long, linear in outline; style 4.5–5.5 mm. long, cylindric, glabrous; stigma simple, opening by a terminal pore. *Fruit* (only one seen), 9 cm. long, 3.2 cm. broad, subfalcate; valves flat.

Var. **pubescens**, Phillips.

Rami pubescentes.

NATAL.—Near Little Tugela, *Wood* 2867.

This differs from the species in the pubescent branches and in being sparsely pubescent on the petiole and rachis. The calyx-lobes have a distinct rib and are membranous between the ribs. The variety and the species require further examination when further material comes to hand, as it is probable that the former may be raised to specific rank.

E. suffruticosa, Schinz., in "Mem. Herb. Boiss.," No. 1, 117 (Pl. V, fig. 7).

A bush 2–4 m. high. *Branches* smooth, glabrous, with dark bark. *Leaves* bipinnate; 16–24 cm. long, about 20-jugate; petiole and rachis glabrous; pinnae 2–7 mm. long; pinnules 3–5.5 mm. broad, linear, acute or subacute, manifestly unequal-sided at the base, with a distinct midrib approaching one margin of the pinnule, glabrous. *Inflorescence* up to 10 cm. long, cylindric. *Flowers* pedicelled. *Pedicels* 0.25–0.75 mm. long, articulated at the base or apex. *Calyx-tube* 1 mm. long, campanulate, glabrous; lobes 0.5 mm. long, ovate, obtuse. *Petals* 3 mm. long, 1 mm. broad, lanceolate, acute or subacute. *Filaments* connate at the base, 5 mm. long, cylindric, glabrous; anthers 0.75–1 mm. long, elliptic, with a stalked caducous gland at the apex. *Ovary* sessile, 2.5 mm. long, linear in outline, glabrous; style 2.5–3.5 mm. long, cylindric, glabrous; stigma simple opening by an apical gland. *Fruit* 8–26 cm. long, 1.7–2.5 cm. broad, linear, very rarely oblong, valves flat.

RHODESIA.—Umtali District: Odanzi River Valley, *Teague* 291.

SOUTH-WEST AFRICA.—Okahandja, 1300 m., November, *Dinter* 314, February, *Dinter*, 2781; Bull's Mouth Pass on steep slopes, bush 10–15 ft. high, December, *Pearson in Percy Sladen Memorial Exped.* 8919, and in *Herb. Musei Austro-Afric.* 11972; Awas Mountains, Pass between Haris and Aub, January, *Pearson in Percy Sladen Memorial Exped.* 9658.